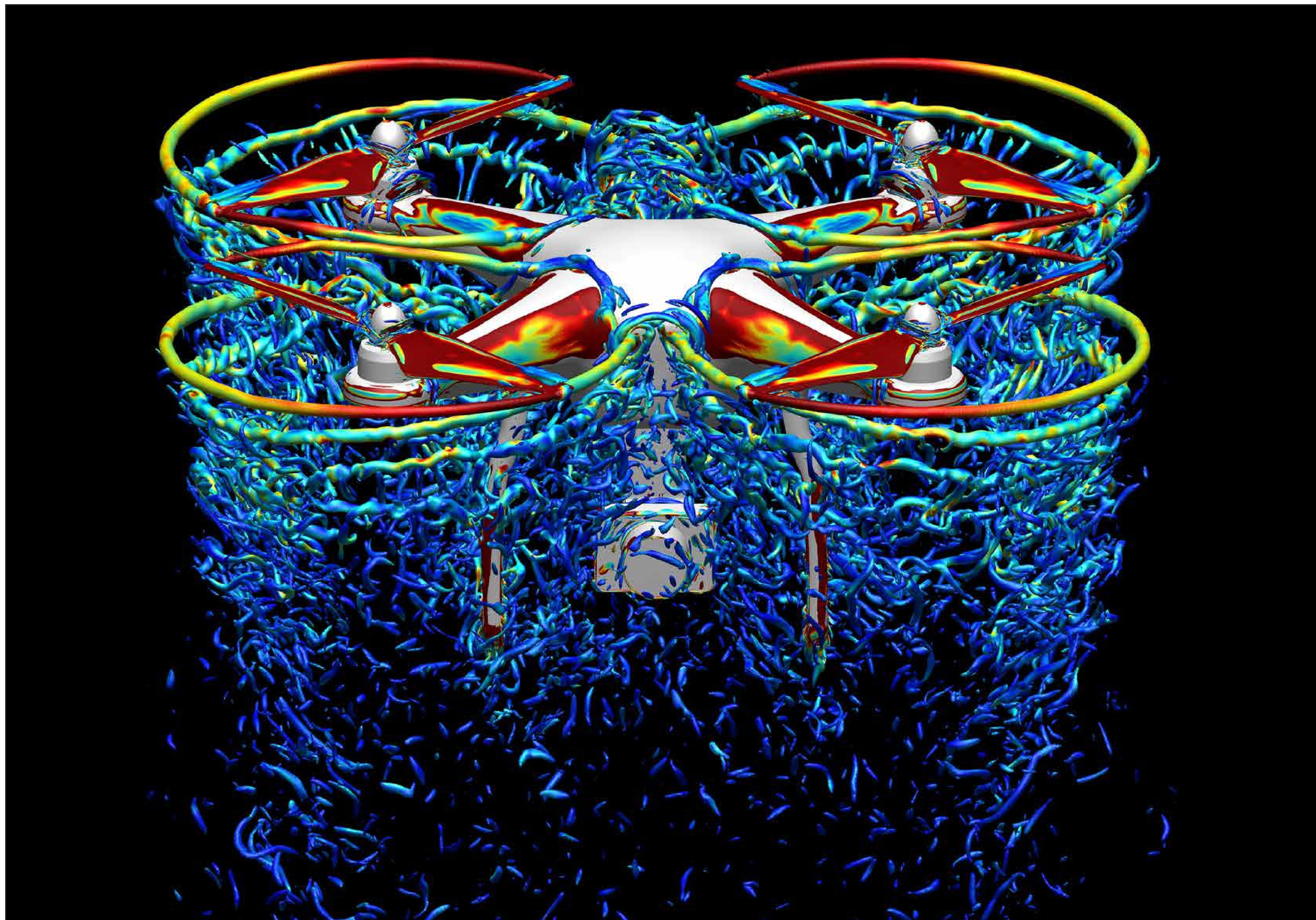
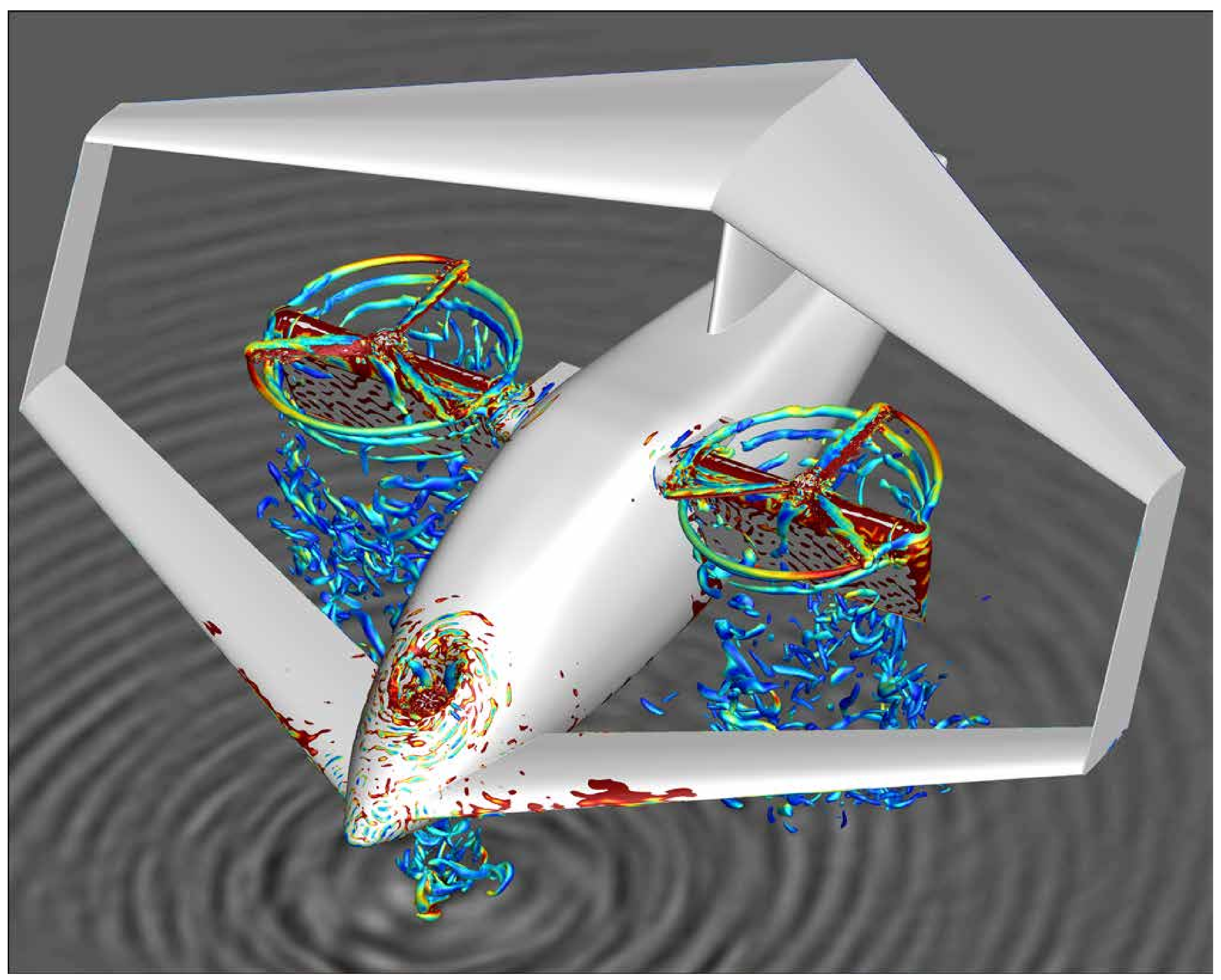


Visualization of the flow of NASA's modified design of a complete DJI Phantom 3 quadcopter configuration in hover. The vortex wake is colored by vorticity magnitude (red is high, blue is low). Simulations revealed the complex motions of air due to interactions between the rotors and the airframe.
Patricia Ventura Diaz, NASA/Ames



CFD simulation of the Elytron 4S unmanned air vehicle in helicopter mode. The visualization shows the vortex wake colored by vorticity magnitude (red is high, blue is low). The center wing can tilt and switch from helicopter mode (for vertical takeoff and landing) to airplane mode (for forward flight). The fan in the nose is for pitch control, and it rotates at maximum velocity during takeoff. The slice at the bottom shows the pressure fluctuations at this plane, mainly originating at the nose fan.
Patricia Ventura Diaz, NASA/Ames

National Aeronautics and
Space Administration

Towards Urban Air Mobility

Small electric drones are very popular nowadays, but what if we could use them for human transportation? Full electric propulsion would get rid of emissions and fuel burn in vehicle engines. Multirotor drone configurations will soon provide the capability to take off and land vertically while carrying people, with no need for long runways—think of no traffic in your daily commute!

However, from small drones to medium-sized urban air mobility vehicles—popularly called flying cars—understanding the complex flow structures generated by the rotors and their interactions with each other and the fuselage are crucial for designing quieter, safer, and more efficient vehicles. High-fidelity CFD simulations run on NASA's Pleiades supercomputer are essential to understanding these complex physics problems.

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